

What is claimed is:

1. A component of a ballistic armor, said component comprising at least one projectile-processing layer and at least one backing layer placed behind and bonded to said projectile-processing layer;

said backing layer comprising at least one fiber-reinforced plastic material;

said projectile-processing layer comprising at least one ceramic-rich composite body comprising

(a) a matrix comprising at least one metal comprising silicon; and

(b) at least one reinforcement material comprising a plurality of filler bodies dispersed throughout said matrix; wherein

said ceramic composite body is characterized by a fine-grained microstructure (i) exhibiting no more than a small or slight degree of interconnectivity of the bodies making up the filler material(s), and (ii) made up of morphological features, wherein no more than about 10 percent by volume of said morphological features are larger than about 300 microns in size, and further wherein said ceramic-rich composite body has a hardness of at least about 1100 kg/mm² as measured with a Vickers indenter using a 1 kg load.

2. The ballistic armor component of claim 1, wherein substantially all of said morphological features are smaller than about 350 microns in diameter.

3. The ballistic armor component of claim 1, wherein said ceramic-rich composite body comprises no more than about 30 percent by volume of said metal.

4. The ballistic armor component of claim 1, wherein said ceramic-rich composite body comprises reaction-bonded silicon carbide

5. The ballistic armor component of claim 1, wherein said ceramic-rich composite body comprises siliconized silicon carbide.

6. The ballistic armor component of claim 1, generally having a plate shape, and being curved in at least one dimension.

7. The ballistic armor component of claim 6, wherein said backing layer comprises at least one fiber-reinforced plastic material.

8. The ballistic armor component of claim 7, wherein said fiber comprises at least one material selected from the group consisting of polyethylene, aramid and glass.

9. The ballistic armor component of claim 1, further comprising at least one filler material comprising at least one hard phase dispersed throughout said matrix.

10. The ballistic armor component of claim 9, wherein said composite material comprises at least 65 percent by volume of said at least one reinforcement material.

11. The ballistic armor component of claim 9, wherein said composite material comprises at least 70 percent by volume of said at least one reinforcement material.

12. The ballistic armor component of claim 1, wherein said armor possesses a ballistic stopping power that is at least 90 percent that of a ballistic armor system consisting essentially of a backing layer bonded to a rear surface of a ceramic layer consisting essentially of hot pressed boron carbide.

13. The ballistic armor component of claim 9, wherein said at least one filler material comprises a plurality of crystallites, and wherein substantially all of said crystallites are smaller than about 350 microns in diameter.

14. The ballistic armor component of claim 9, wherein said composite material comprises no more than about 24 percent by volume of said silicon carbide of said matrix.

15. The ballistic armor component of claim 9, wherein said filler bodies consist at least predominantly of particulate.

16. The ballistic armor component of claim 15, wherein said filler bodies further consist essentially of silicon carbide.

17. The ballistic armor component of claim 1, wherein said composite further comprises up to about 24 percent by volume of beta-SiC.

18. The ballistic armor component of claim 17, wherein said beta-SiC exists as a coating on said filler bodies.

19. The ballistic armor component of claim 17, wherein said beta-SiC exists as a reticulated structure at least partially interconnecting said filler bodies.

20. A component of a ballistic armor, said component comprising at least one projectile-processing layer and at least one backing layer placed behind and bonded to said projectile-processing layer;

said backing layer comprising at least one fiber-reinforced plastic material;

said projectile-processing layer comprising at least one ceramic-rich composite body made by a process comprising

(a) providing a porous body comprising at least one hard filler, interconnected pores, and substantially no free carbon;

(b) infiltrating said pores with a molten metal comprising silicon; and

(c) solidifying said molten metal to form a substantially pore-free ceramic-rich composite body consisting essentially of morphological features substantially none of which are larger than about 350 microns in size, and wherein said composite body has a hardness of at least about 1100 kg/mm².

21. The ballistic armor component of claim 20, wherein said bodies of said hard filler material exhibit substantially no contact to one another.

22. The ballistic armor component of claim 20, wherein said bodies of said hard filler material exhibit a small or slight degree of contact to one another.

23. The ballistic armor component of claim 20, wherein said porous body is self-supporting.

24. The ballistic armor component of claim 20, wherein said porous body has been sintered.

25. The ballistic armor component of claim 20, wherein once said porous mass is provided, said mass thereafter is never exposed to a temperature in excess of about 2100°C.

26. The ballistic armor component of claim 20, wherein said porous mass comprises silicon carbide particulate.

27. The ballistic armor component of claim 20, wherein said bodies making up said hard filler material have a Vickers hardness of at least about 2400 kg/mm².